450. Proposed by W. L. WATSON, Moundsville, W. Va.

If three straight lines AA', BB', CC', drawn from the vertices of a triangle ABC to the opposite sides, pass through a common point O within the triangle, then

$$\frac{OA'}{AA'}+\frac{OB'}{BB'}+\frac{OC'}{CC'}=1.$$

CALCULUS.

When this issue was made up solutions of 354–5–6–7–8–9, 361–2–6–9 had been received. Solutions of 332–39–40–42–64–65 are desired.

370. Proposed by PAUL CAPRON, United States Naval Academy.

The surface of a right circular cone, having the semi-vertical angle α, is cut by two planes which intersect the axis at the same point, one at right angles to the axis, the other making the angle $(90°-\beta)$ with the axis. Show that, if the lateral surface of the right cone is S_1 and that of the oblique cone S_2,

$$S_2=\sum_1^\infty T_n,\ \text{where } T_1=S_1,\qquad T_{n+1}=T_n\times\frac{2n+1}{2n}(\tan\alpha\tan\beta)^2.$$

371. Proposed by B. F. FINKEL, Drury College.

Prove that the shortest distance between two curves or two surfaces is normal to both.

MECHANICS.

When this issue was made up solutions of 271–4–5, 288–9, 292–3–4–5–7 had been received. Solutions of 268–9, 277–8–9, 286–7 are desired.

298. Proposed by C. N. SCHMALL, New York City.

A person desires to throw a stone so as to strike the greatest possible blow at a point in a smooth vertical wall at a height h above the ground. If his strength is sufficient to throw the stone vertically upwards to a height $2h$, show that he must stand at a distance $2h$ from the wall. (The resistance of the air, and the height of the hand are not taken into account.)

299. Proposed by B. F. FINKEL, Drury College.

A cone rests in two fluids which do not mix, with its vertex downwards and its base in the surface of the upper fluid; to find how much its density must be increased, that it may rest with its base in the common surface of the fluids.

[From Walton's *Hydrostatical Problems.*]

NUMBER THEORY.

When this issue was made up solutions of 207–10–12–13–16–18–20 had been received. Solutions of 189, 191–4–6, 200–5–8–9–11–13–14–15 are desired.

222. Proposed by A. H. HOLMES, Brunswick, Maine.

Find rational values for m and n in order that $(m^2+1)^2/m^2+(n^2-1)^2/n^2$ may be the square of an integer.

223. Proposed by THOS. E. MASON, Bloomington, Indiana.

Show that

$$\frac{(rst)!}{t!(s!)^t(r!)^{st}}$$

is an integer (r, s, t being positive integers). Generalize to the case of n integers $r, s, t, u, \cdots$.
(Carmichael, *Theory of Numbers*, p. 28.)